DOE Safety and Security Enforcement Workshop

Worker Safety and Health Case Summaries

April 2011

Objective:
To determine NTS reportability for each case, according to Appendix A of the *DOE Enforcement Process Overview*.

Instructions:

1. Read each case and determine if there are any noncompliances.
2. Does the case meet an NTS threshold that is based on the occurrence reporting criteria (Table A.1)?
3. If not, does the case indicate repetitive noncompliances, a programmatic breakdown, intentional violation, or other reportable conditions (Table A.2)?
4. Are there any other significant conditions that may warrant reporting into NTS?
5. For some cases, there is additional information the facilitator can provide that is not included in the case summary.
6. Record your answers in the box below each case summary.

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1. Failure to Follow Proper Work Control Process

An insulator reported to a modular building to remove a section of insulation in support of a maintenance job for replacing a leaking backflow preventer connected to a water line, which was scheduled for completion the following day. The line was located behind the modular building's skirting. The heat trace for the water line was plugged into a 120V outlet adjacent to the backflow preventer.

The insulator did not notify supervision that he was going to work on replacing the backflow preventer. He was working under a general maintenance work package. He completed a pre-job safety task analysis identifying the intended scope; however, he did not recognize all the associated hazards of the task. The insulator was aware of the heat trace, but forgot about it when cutting the insulation with a knife. The knife blade contacted the heat trace and produced a small arc flash. The insulator was not injured. Based on the electrical severity calculation, this event met a low medium significance rating (30 - 1750).

The insulator was wearing the proper protective equipment for the insulation work scope, but not for an electrical hazard. He was wearing gloves, and the knife had an insulated handle, but neither were voltage rated. The heat trace was GFCI protected, but the work package did not stipulate it being tested, verified, or documented prior to work.

The general maintenance work package did not have specific documentation to address insulation removal or a hazard analysis. It was determined this activity was outside the scope for the work package resulting in a failure to follow the proper work control process.

ORPS Reporting Criteria:
Significance Category: ***3***
Reporting Criteria: ***2C(2) - Personnel Safety and Health, Hazardous Energy Control –***
"*Failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout) or disturbance of a previously unknown or mislocated hazardous energy source (e.g., live electrical power circuit, steam line, pressurized gas) resulting in a person contacting (burn, shock, etc.) hazardous energy."*

What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

2. Underground Bulkhead Door Contacts Electric Cart

A large underground bulkhead door closed and contacted an electric cart as the cart traveled past the door. Opening and closing of the bulkhead door is actuated by pull ropes on each side of the door opening. Two employees, one driving a forklift and one driving an electric cart, were traveling through the open bulkhead door. The forklift driver arrived at the door first and pulled the rope to open the door, then proceeded past and waited for the electric cart driver. As the electric cart driver was proceeding through the opening, the door began to close. He continued moving forward in an attempt to clear the door before it shut. The door contacted the right side of the electric cart, pushing the cart to the left. There was minor damage to the electric cart and the bulkhead door. There were no injuries.

A review of the incident revealed a failure of the top hinge of the bulkhead door. Three years prior to this event additional weight had been added to the door. No other modifications to the ancillary components associated with the door frame and mechanisms involved with opening and closing the door were made after this design change. Prior to this event both the top and bottom welds associated with the door hinge had failed and had to be repaired.

ORPS Reporting Criteria:
Significance Category: ***3***
Reporting Criteria: ***10(3)*** **Management Concerns/Issues, A Near Miss –** *"where no barrier or only one barrier prevented an event from having a reportable consequence. One of the four significance categories should be assigned to the near miss, based on an evaluation of the potential risks and the corrective actions taken."*

What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

3. Personnel Exposure to Acid

A summer student had just completed cleaning glassware used in an acid digestion process. As the student was removing personal protective equipment (gloves and lab coat), a small amount of liquid from the outside of the lab coat made contact with the student's right hand. The student felt irritation and assumed it was the acid solution (made up of dilute nitric acid and hydrofluoric acid (HF)). The student immediately washed both hands and applied calcium gluconate, a treatment for HF skin exposure, as a precaution. The student reported this event to the supervisor, but the supervisor decided the student did not need to report to the site's occupational health department. The supervisor assumed there was no HF exposure. Later that evening, the student again experienced irritation and went to an off-site hospital emergency room (ER). ER staff applied topical calcium gluconate as well as injections of calcium gluconate. The student reported the ER visit to the supervisor the next day. However, the contractor did not realize the extent of this exposure and it was not reported or determined as OSHA recordable until one month later.

The site's industrial hygienists indicated that the regulatory limit for HF skin contact is exceeded when possible systemic damage may occur. Additionally, the site's environment, safety, and health manual states that when there is a potential exposure to HF, the employee is required to report to the site's health services department.

ORPS Reporting Criteria:

Significance Category: ***2***

Reporting Criteria: **2A(4) -** *Personnel exposure to chemical, biological, or physical hazards above limits established by OSHA or /ACGIH, whichever is lower, and that requires the administration of medical treatment beyond simple first aid on the same day as the exposure.*

What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

4. <u>Lockout/Tagout Program Implementation</u>

A contractor reviewed the implementation of their Lockout/Tagout (LOTO) program and found a number of LOTO issues that were reported in the last 18 months. The review identified human errors, administrative deficiencies, and inadequate isolation boundaries. Contributing factors to the recurrence of LOTO issues involved: poor implementation of Contractor Assurance Systems for identifying and preventing recurrent LOTO problems; less than adequate resolution of past events; cause analyses that lacked depth; weak corrective actions; and deficient initial hazardous energy identification during the work control job hazard analysis.

The following causal factors were identified:

- A single point of authority to ensure the effectiveness of the LOTO program was never assigned.
- Management did not consistently communicate LOTO performance expectations nor did management create the systems needed to prevent future degradation of performance levels.
- Many issues from past events involved administrative documentation and isolation determination/verification errors. LOTO process barriers (i.e., verifications) had not been effective in identifying errors.
- Less than adequate rigor had been applied throughout the LOTO process during numerous verification and action steps. There was no additional oversight for complex LOTO planning.
- Many designated LOTO personnel did not conduct LOTO frequently, and thus a proficient team of LOTO qualified individuals was not maintained.

ORPS Reporting Criteria:
Significance Category: ***R (Recurring)***
Reporting Criteria: ***2C(2) – Personnel Safety and Health, Hazardous Energy Control –*** *"Failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout) or disturbance of a previously unknown or mislocated hazardous energy source (e.g., live electrical power circuit, steam line, pressurized gas) resulting in a person contacting (burn, shock, etc.) hazardous energy."*

What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

5. Potential Chemical Exposure

Two Health Physics Technicians (HPT-1 and HPT-2) noticed an unusual odor as they were preparing to survey several planchets (small shallow metal containers in which radioactive substances are deposited for measurement of activity) for subsequent transfer to a counting room. Upon opening a planchet, a chemical technician and the two HPTs smelled an odor (a strong chemical smell) and experienced headaches, throat irritation, and a burning sensation to the nose and eyes. The sample carrier was closed and all samples were moved back to the hood and bagged.

The three exposed employees were transported to the site medical clinic for evaluation. They were released to return to work with no restrictions. Air samples were negative.

Later, it was learned that a third HPT, who was in the room at the time of the potential exposure event, had experienced symptoms, which included a burning sensation in his nose, and pressure and headache on the left side of his head; he was still experiencing the burning sensation in the nose and left side of the eye. The third HPT and the other involved individuals reported they were also still experiencing a variety of symptoms. They were sent back to site medical for re-evaluation. All were released, and returned to work.

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What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

6. **<u>Evaluation Process of the Respiratory Protection Program Not Fully Implemented</u>**
   A contractor's DOE Site Office conducted a comprehensive institutional review of the contractor's respiratory protection program. During the review, the site office identified the following:

   1- The contractor's respiratory protection hazard evaluation did not always include objective data or estimated workplace exposure values to justify selected respirators.

   2- The contractor's implementation of a respirator maintenance and care program in the field does not meet OSHA requirements.

The contractor's causal analysis identified the following causes:

- Respirator users and their supervisors do not have access to established requirements in implementing documents. Instead, they rely on retention of training material.
- There are too many written procedures/routines for the ES&H Technicians. As a result, supervisors are unable to effectively evaluate the quality of technicians' performance, and, the technicians are unable to perform all their assigned routines effectively.
- Hazard analysis control sheets do not identifying respirator issue locations.
- Respirator maintenance and storage responsibilities of respirator users and their supervisors are not documented in the ES&H Manual.
- Training material does not address the supervisor's responsibility to evaluate the implementation of respirator maintenance and storage requirements.

This was not reported into ORPS.

What are the potential noncompliances?

Does this event meet the NTS reporting threshold?

7. Discovery of Unexpected Hazardous Energy Source

A commercial vendor was brought into a contractor's leased facility to provide "hands-off" technical support to contractor researchers to tune an induction power supply. Prior to the visit, contractor staff and the vendor executed a preliminary hazards assessment form. However, the form was not routed to the appropriate staff and was unclear regarding the work scope. During the troubleshooting of the power supply, the vendor retrieved a multi-meter from his tool bag and proceeded to take readings on the energized output leads. The electricians did not recognize the implication of what the vendor was doing when he pulled out his multi-meter; they were unaware the output leads were energized. Therefore, they did not stop the work. The researcher and electricians that were present during the troubleshooting of the power supply understood that the vendor was not to perform work on energized parts. Once the electricians realized the output leads were energized, they stopped the work and applied lockout tag out.

The vendor exceeded his scope of work by taking voltage readings on energized output leads. The contractor's Electrical Safety Program and the manufacturer's instruction manual required equipment guarding; the instruction manual stated that guards should be installed to prevent contact between personnel and RF output leads and load coils.

ORPS Reporting Criteria:
Significance Category: 3
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What are the potential noncompliances?

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8. Worker Protection Systems

As part of a conduct of engineering implementation, engineers conducted a system adequacy analysis on worker protection systems. The engineers found three systems that were not able to perform their intended safety function. These three systems (in different buildings) were:

1. The ventilation system for the shops, which is a uranium machining area, has potentially inadequate air flow to protect workers.

2. A lightning protection system was determined to be inoperable in an assessment performed three years ago. Follow up documentation revealed a work order had been initiated the year following the assessment, but the work was canceled due to funding. Preventive maintenance was performed with results pending and no compensatory measures established.

3. A radioactive waste line has a known material incompatibility condition, which causes concern about the system's reliability.

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ORPS Significance Category: ***3***
ORPS Reporting Criteria: ***10(3)*** **Management Concerns/Issues, A Near Miss –** *"where no barrier or only one barrier prevented an event from having a reportable consequence. One of the four significance categories should be assigned to the near miss, based on an evaluation of the potential risks and the corrective actions taken."*

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9. <u>Powered Air Purifying Respiratory Battery Failure</u>

A technician was setting up air samplers in a trench in preparation for further activities. He was wearing a full set of anti-contamination clothing, fall restraint harness, and a Powered Air Purifying Respirator (PAPR) with hardhat. After about 20 minutes of operation, an accompanying safety and health specialist noticed the technician's PAPR hood facepiece was fogging. The technician asked for help and received assistance in exiting the trench. Once out, the technician collapsed, experiencing shaking and difficulty breathing. The technician recovered shortly after.

Investigations indicated an older style nickel cadmium (NiCad) battery failed to provide sufficient power to the PAPR blower thereby reducing air supply and exacerbating buildup of exhaled carbon dioxide inside the hood. The battery had been fully charged about 30 days prior. It had been placed in storage and apparently lost charge over time. The PAPR passed an initial pre-use test the previous morning.

The site experienced a situation five years prior involving the same manufacturer and model of PAPR with NiCad batteries. In this case, the PAPR failed to operate for the full 8-hours as was anticipated. There were discussions with the manufacture regarding the cause. At the time the site linked the incident to a single stage charger for the PAPR batteries that lacked a charge status indicator. An alternate brand PAPR was also available at the site that did have this feature - no battery failures had been encountered with the alternate brand.

Finally, around the same time another operation at the site changed from the PAPR with NiCad batteries to the other available brand because of unreliable battery performance. The change to the alternate brand was kept internal and not documented or fully communicated across the site at the time.

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10. <u>Inadvertent Release of Steam into a Mechanical Room</u>

Steam fitters were restoring a main steam line in a manhole after a maintenance shut down for repairs. However, they did not realize that the main high pressure steam supply valve (125psi) was not closed during the original shutdown, which caused a steam leak through an open drain valve in the mechanical room of an unoccupied building. This caused a fire alarm; fire and rescue immediately responded. The situation was remedied by securing the main steam valve. There were no occupants in the building at the time, and there were no injuries or property damage reported. The mechanical room where the steam leak occurred is normally unoccupied. If the mechanical room had been occupied for any reason at the time of the release the person could have simply closed the valve or vacated the room.

There were no requirements during system startup to identify any valves that may have been left in the open position during the original shutdown. The startup work document did not include assignment of specific tasks. Typically, supervisors verbally identify tasks and then assign individuals for the operation.

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